

1970

**OPERATING
SUMMARY**

NEPEAN

**water pollution
control plant**

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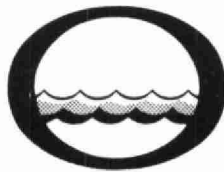
Division of Plant Operations

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Water management in Ontario

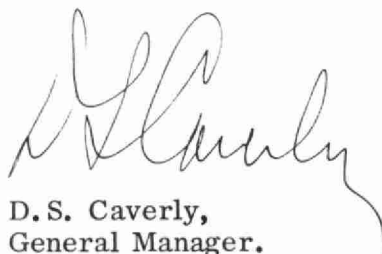
Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario


Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.



D. S. Caverly,
General Manager.



D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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NEPEAN
water pollution control plant

operated for

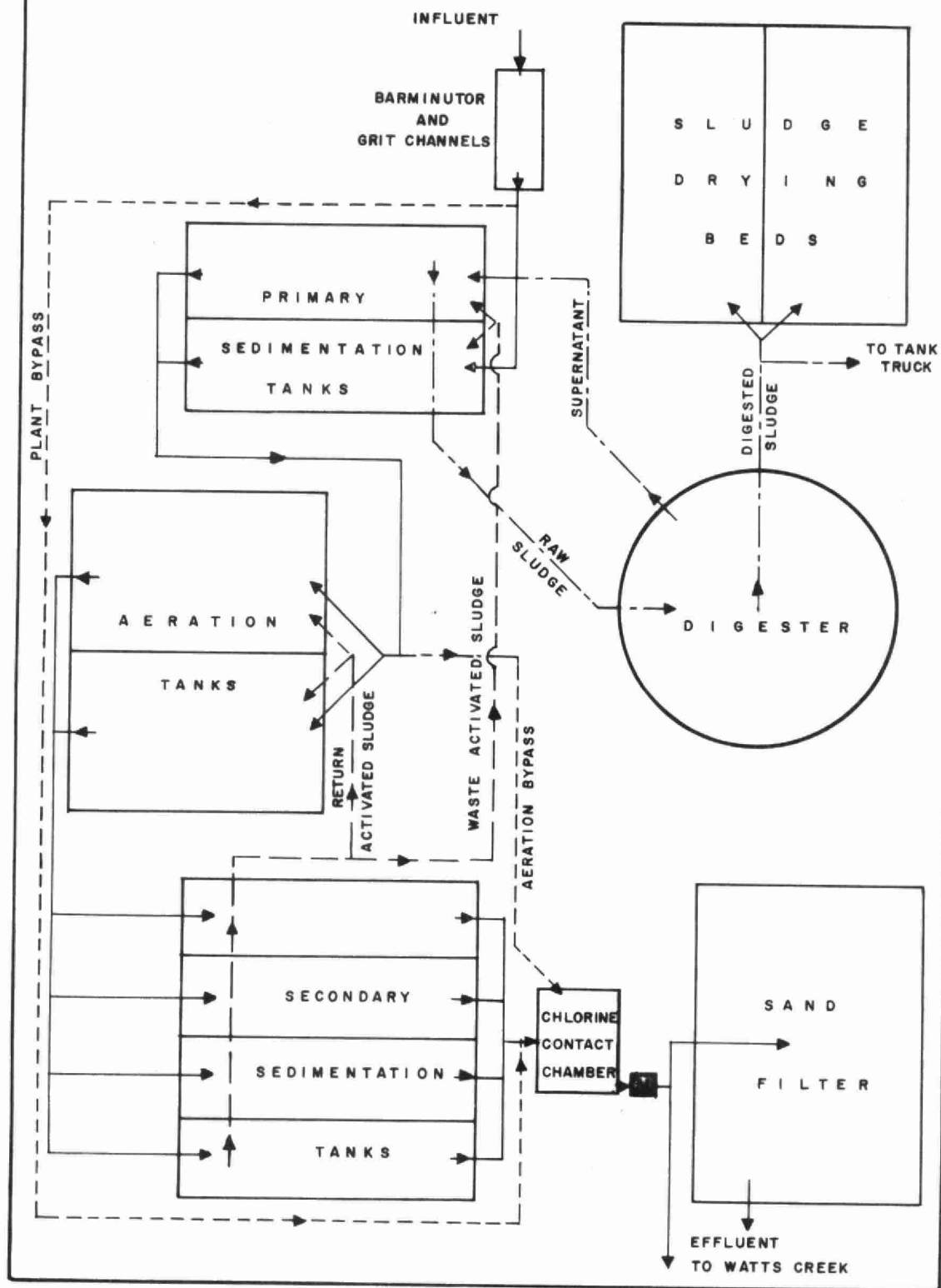
THE TOWNSHIP OF NEPEAN

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

TOWNSHIP OF NEPEAN WATER POLLUTION CONTROL PLANT



DESIGN DATA

PROJECT NO.	2-0035-59	TREATMENT	Activated Sludge
DESIGN FLOW	1.50 mgd	DESIGN POPULATION	15,000
BOD - Raw Sewage	140 mg/l	SS - Raw Sewage	295 mg/l
- Removal	95%	- Removal	90%

PRIMARY TREATMENT

Screening

Type: Manually cleaned
Size: One, 2" spacing

Grit Removal

Type: Channel, manually cleaned
Size: Two $35\frac{1}{2}' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ (1150 gal each)
Retention: 1.1 min (one channel)

Primary Sedimentation

Type: United Steel (Rex San.)
Size: Two $60' \times 15' \times 9'$ (101,000 gal)
Retention: 1.62 hr
Loading: Surface, 835 gal/ft²/day
Weir, 9,450 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical; single-pass
Size: Two $90' \times 30' \times 12\frac{1}{2}'$ (67,500 cu ft
or 0.42 mil gal)
Retention: 6.8 hr

Aerators

- Six Ames Crosta

Secondary Sedimentation

Type: United Steel
Size: Four $60' \times 15' \times 9'$ (202,000 gal)
Retention: 3.1 hr
Loading: Surface, 420 gal/ft²/day
Weir, 4,580 gal/ft/day

CHLORINATION

- One W & T Type A-731

Chlorine Contact Chamber

Size: One $32' \times 16' \times 5\frac{1}{2}'$ (17,600 gal)
Retention: 17 min

TERTIARY TREATMENT

Type: Sand filter
Size: Four $175' \times 175'$

OUTFALL

- to Watts Creek

SLUDGE HANDLING

Digestion system - Single-stage

Type: PFT; with floating cover
Size: One $60'$ dia $\times 21'$ swd
(59,200 cu ft or 0.37 mil gal)
Loading: 2.02 lb/cu ft/mo

Disposal

- Lagoons (2)

PUMPING STATIONS

Woodroffe Avenue

Type: Canada Pumps, Buffalo
Size: One 250 gpm @ 46' tdh
One 700 gpm @ 46' tdh
One 1160 gpm @ 46' tdh
Stand-by Engine: Wisconsin
1 Gorman-Rupp T8A 2 MGD @ 45' tdh

Shirley's Bay

Type: Canada Pumps
Size: Two 1160 gpm @ 25' tdh
One Gorman Rupp, T8A 2 mgd
One Canada Pump 3160 gpm @ 43' tdh
Wisconsin Engine

'70 REVIEW

GENERAL

The Township of Nepean project comprises a 1.5 mgd treatment plant, two pumping stations, associated forcemains and a trunk sewer.

Operating problems during the year centered mainly on frozen and damaged temporary forcemains at both pumping stations. Although this problem did not affect the capacity of the Woodroffe Avenue pumping station, flooding of some sewers in the Crestview Subdivision occurred again in the spring.

Remedial measures taken by the Township consisted of operating a 40 H. P. portable pump at the temporary Crestview pumping station, four smaller portable pumps at various locations in the area, and overflowing through a 14 inch emergency connection into a storm sewer.

Hydraulic overloading in the spring, also resulted in overflowing raw sewage from the Shirley's Bay pumping station into Watts Creek; and by discharging through manholes in the trunk sewer, the flooding of a large portion of N.C.C. property near the plant.

Sleeves and bearings were changed on three variable speed return sludge pumps and the two sludge recirculating pumps. A broken flight became jammed in the west primary tank resulting in considerable damage to the sludge collector mechanism. All the flights were replaced, the longitudinal idler and drive shafts were straightened, the bearing housings were welded and all the shaft bearings were replaced. Sleeves and bearings were replaced in the No. 2 and No. 3 pumps at the Woodroffe Avenue pumping station. A sleeve was replaced in the No. 1 pump at Shirley's Bay and the seal cavity unit was replaced in the Gorman Rupp pump.

The iron wearing shoes were replaced on all the primary longitudinal and cross collectors.

Due to a suspected break in the sludge withdrawal pipe and gas withdrawal pipe, the digester was emptied and cleaned. The suspected breaks were confirmed and modifications made to prevent these failures from re-occurring.

The plant was operated by a staff of five. One operator resigned in August of 1970 and the vacancy was not filled until November.

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	2.77	—	86.5	—
High	4.58	April	137.5	April
Low	1.71	August	50.5	February

PLANT FLOWS and CHLORINATION

The average daily flow increased by 0.67 million gallons over 1969's value to 2.77 million gallons which exceeded the design capacity of the plant 94% of the time. The increased sewage flows are due to infiltration of storm water into the sanitary sewers and a general increase in the population of the areas served.

The effluent from the treatment plant was chlorinated on a year-round basis. The necessary parts to convert the chlorinator to a flow proportional unit were ordered in the latter part of 1970. An average chlorine dosage of 5.1 milligrams per litre was required to obtain an 0.5 mg/l chlorine residual after a 15 minute contact period.

EXPENDITURES

The cost of operating the treatment plant and pumping station was \$84,849.87 or \$81.71 per million gallons treated. The 1970 budget was exceeded because of the unscheduled digester cleanout and emergency repairs to frozen temporary forcemains.

PLANT EFFICIENCY

The average reduction in the BOD and suspended solids of the raw sewage treated at the plant was 74% and 79% respectively. Poor efficiencies were due to hydraulic overloading and the relatively weak loading of the raw sewage.

SLUDGE DIGESTION and DISPOSAL

The total volume of raw sludge pumped to the digesters was 2.84 million gallons. The total volume of digested sludge disposed of in the sludge lagoons was .970 MG. This figure includes the total contents of the digester that were pumped to the lagoon when the digester was cleaned out. An additional .185 MG of raw sludge was hauled to a land disposal site by a local contractor during the digester clean out.

CONCLUSIONS

The treatment plant and pumping stations were again hydraulically overloaded. This problem has existed for several years and has resulted in inefficient sewage treatment, difficult operation and considerably bypassing of raw sewage to surface water courses. Expansion should be expedited regardless of the ownership status.

PROJECT COSTS

2-0035-59 NET CAPITAL COST (Final)	\$1, 444, 574. 46
DEDUCT - Portion financed by CMHC/MDLB (Final)	<u>670, 000. 00</u>
Long Term Debt to OWRC	\$ <u>774, 574. 46</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ <u>179, 846. 50</u>
Net Operating	\$ 84, 849. 87
Debt Retirement	15, 631. 00
Reserve	9, 737. 10
Interest Charged	<u>43, 396. 48</u>
TOTAL	\$ <u>153, 614. 45</u>

RESERVE ACCOUNT

Balance @ January 1, 1970	\$ 11, 082. 33
Deposited by Municipality	9, 737. 10
Interest Earned	<u>908. 39</u>
	\$ 21, 727. 82
Less Expenditures	<u>-</u>
Balance @ December 31, 1970	\$ <u>21, 727. 82</u>

PROJECT COSTS

2-0076-61 NET CAPITAL COST (Final)	\$160,984.91
DEDUCT - Portion financed by CMHC/MDLB (Final)	
Long Term Debt to OWRC	<u>\$160,984.91</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	<u>\$ 38,108.87</u>
Net Operating	\$ -
Debt Retirement	3,249.00
Reserve	595.23
Interest Charged	<u>9,019.37</u>
TOTAL	<u>\$ 12,863.60</u>

RESERVE ACCOUNT

Balance @ January 1, 1970	\$ 9,068.71
Deposited by Municipality	595.23
Interest Earned	<u>599.21</u>
	\$ 10,263.15
Less Expenditures	-
Balance @ December 31, 1970	<u>\$ 10,263.15</u>
No charges against Project #2-0201-66	

1970 OPERATING COSTS

• PAYROLL	46	%
• FUEL	1	%
• POWER	13	%
• CHEMICALS	12	%
• GENERAL SUPPLIES	3	%
• EQUIPMENT	5	%
• REPAIRS & MAINTENANCE	11	%
• SUNDRY	8	%
• WATER		%
• TRAVEL	<1	%

TOTAL ANNUAL COST

NET OPERATING	52	%
DEBT RETIREMENT	11	%
INTEREST	31	%
RESERVE FUND	6	%

Yearly Operating Costs

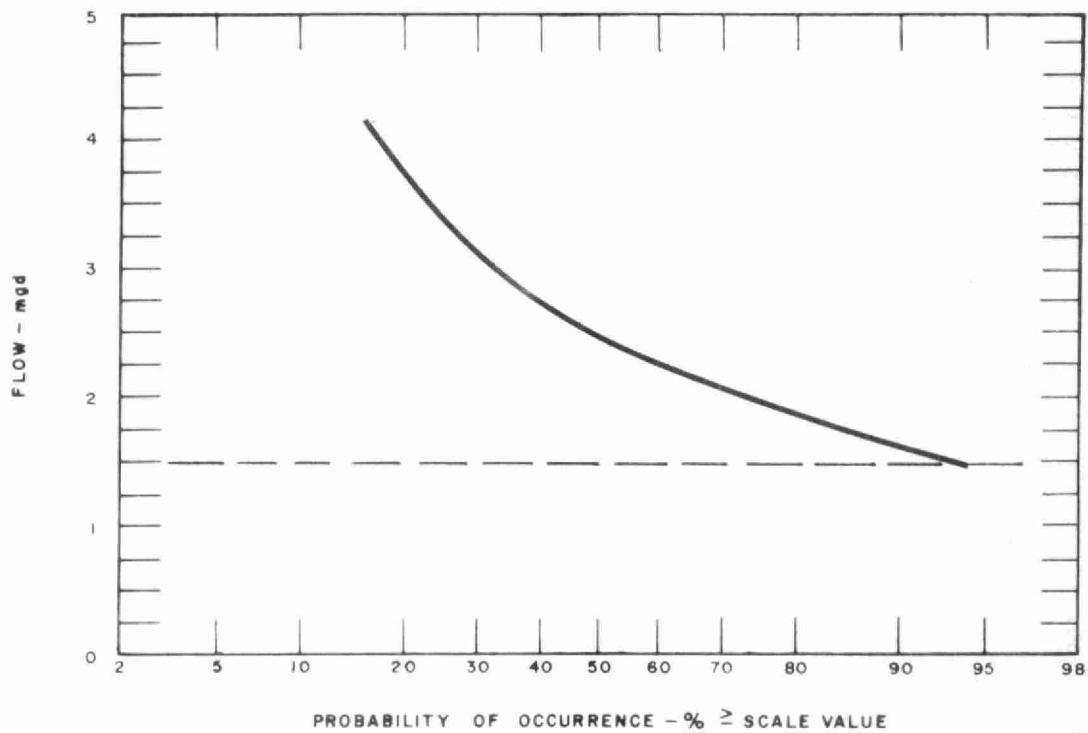
YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	886.1	\$32,490.61	\$36.67	9 cents
1967	1010.5	33,588.90	33.24	16 cents
1968	1025.1	45,317.05	44.21	20 cents
1969	777.6	71,457.17	91.89	15 cents
1970	1038.4	84,849.87	81.71	24 cents

MONTHLY OPERATING COSTS

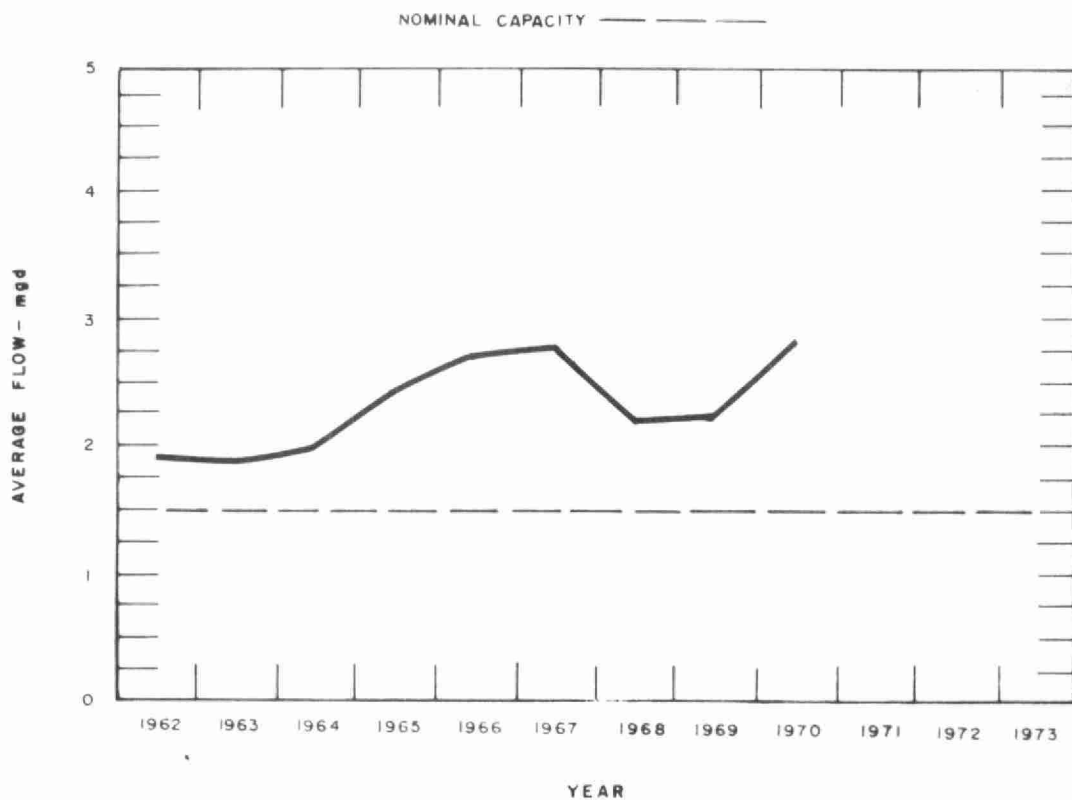
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY	WATER	TRAVEL
JAN	4685.05	4249.06	-	-	-	-	241.82	-	163.55	30.62	-	-
FEB	5664.81	3148.23	-	127.58	1574.36	-	389.07	-	165.53	146.39	-	113.65
MAR	5598.72	3080.83	-	144.60	698.95	892.71	225.87	266.14	249.00	40.62	-	-
APR	4526.39	3031.94	-	-	755.45	-	90.33	91.41	476.09	81.17	-	-
MAY	6429.73	3512.75	-	-	980.90	-	540.79	-	1323.18	72.11	-	-
JUNE	5155.81	3038.03	-	236.80	978.95	-	133.70	-	574.61	118.02	-	75.70
JULY	10299.53	2987.33	-	124.91	1039.60	1086.75	193.89	2049.60	2774.41	43.04	-	-
AUG	7482.26	5069.22	146.17	-	1035.15	-	244.51	25.58	280.81	680.82	-	-
SEPT	4615.59	2385.05	113.31	-	878.10	-	150.04	-	79.33	895.86	-	113.90
OCT	4221.82	2517.11	48.16	-	1097.90	-	262.82	-	283.23	12.60	-	-
NOV	9248.31	3459.34	-	-	-	4727.84	123.08	-	381.85	466.98	-	89.22
DEC	16921.85	2550.97	-	379.99	2027.80	3198.20	316.55	1921.77	2217.37	4279.20	-	30.00
TOTAL	84849.87	39029.86	307.64	1013.88	11067.16	9905.50	2912.47	4354.50	8968.96	6867.43	-	422.47

BRACKETS INDICATE CREDIT

PROCESS DATA

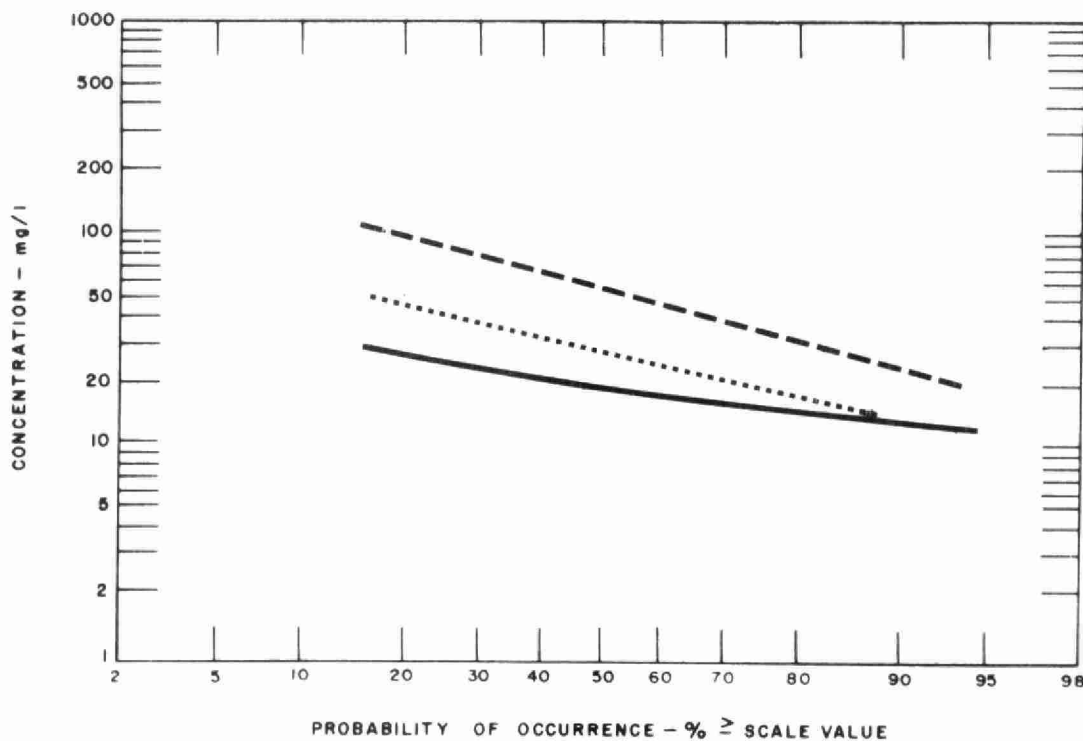


FLAWS

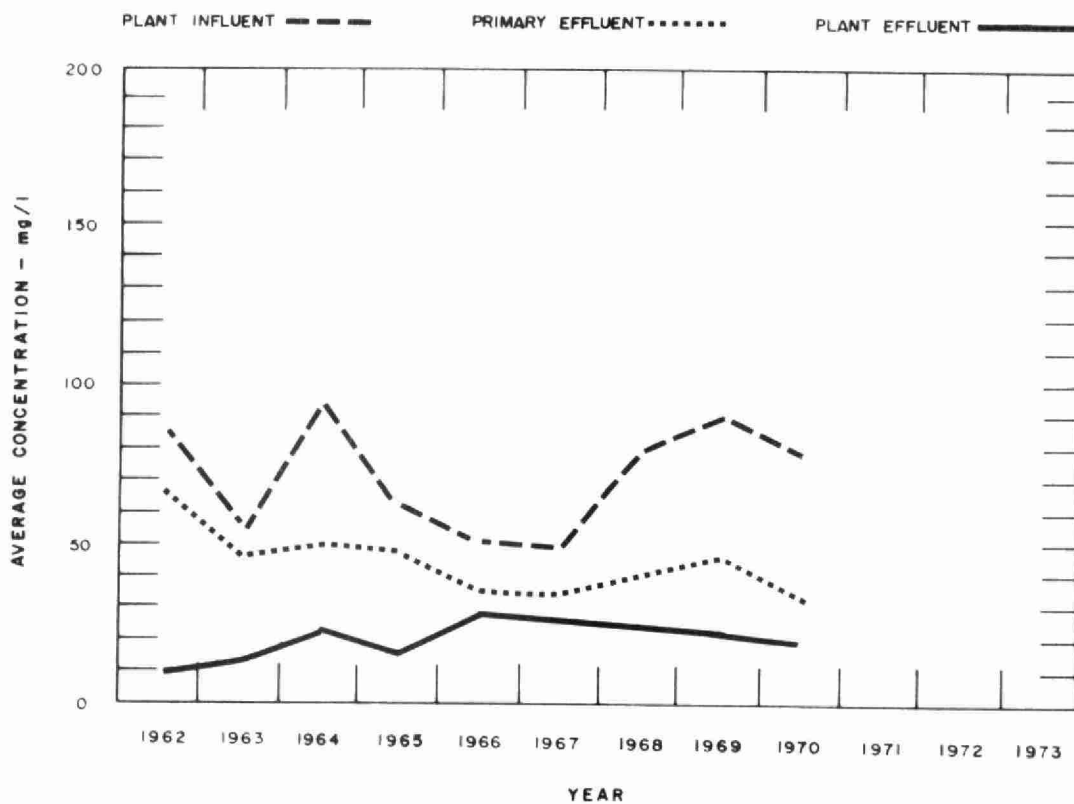


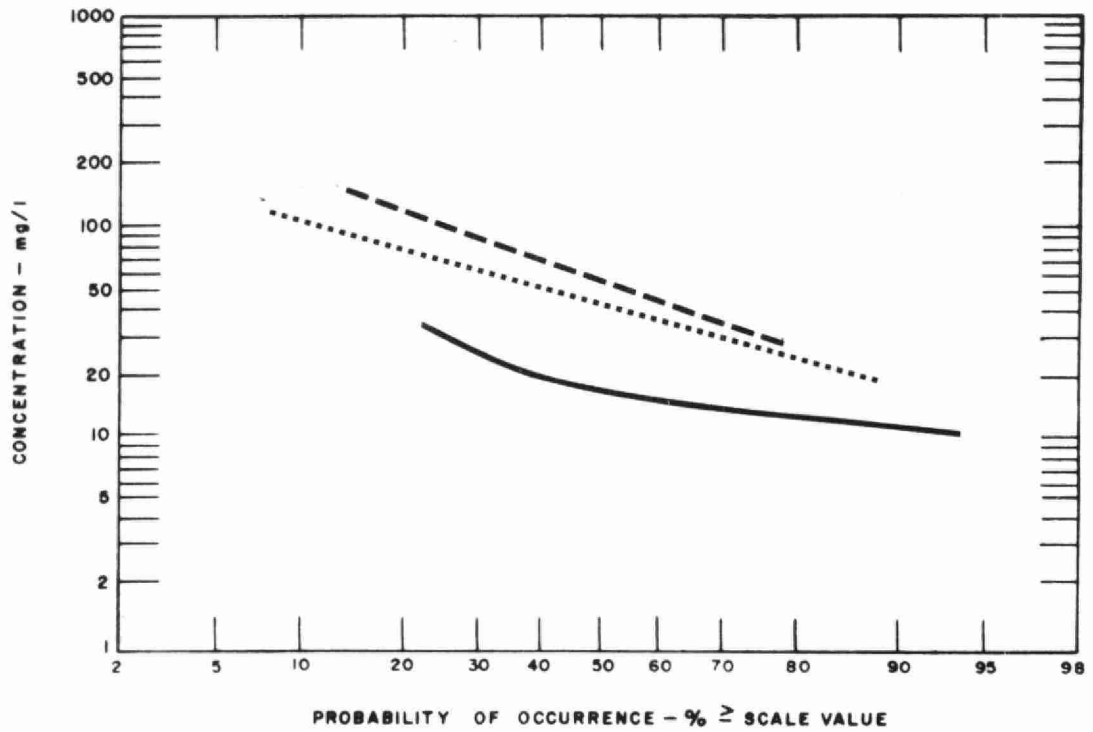
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	56.8	1.83	2.6	1.5	2.86	5.0
FEB	50.5	1.80	2.4	1.4	2.94	5.8
MAR	81.7	2.64	5.2	1.4	3.53	4.3
APR	137.5	4.58	5.1	3.9	5.25	3.8
MAY	125.1	4.04	4.9	2.8	6.33	5.1
JUNE	90.7	2.36	3.2	1.8	7.32	8.0
JULY	64.6	2.09	3.1	1.4	5.56	8.6
AUG	52.6	1.71	2.2	1.3	4.03	7.7
SEPT	64.3	2.30	3.8	1.4	3.37	5.2
OCT	94.4	3.08	4.3	2.3	3.05	3.2
NOV	114.6	3.68	5.0	2.6	4.05	3.5
DEC	105.7	3.18	4.3	2.4	4.64	4.4
TOTAL	1038.4	-	-	-	52.93	-
AVERAGE	-	2.77	-	-	-	5.1

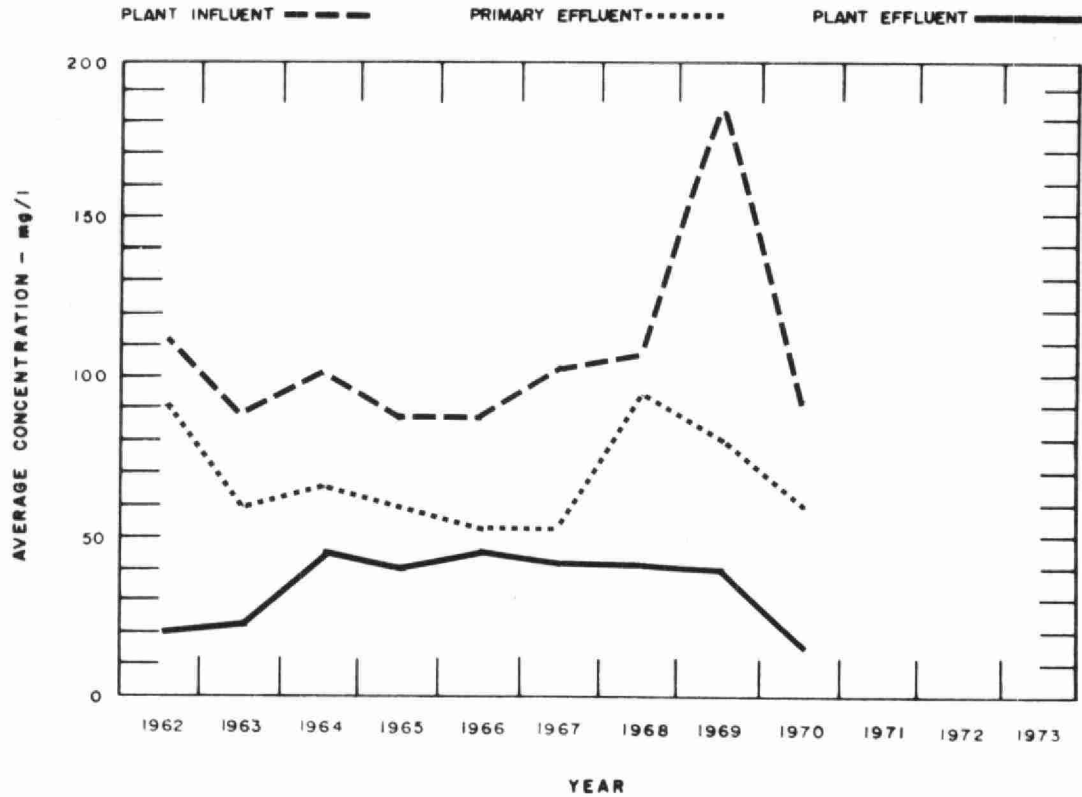


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



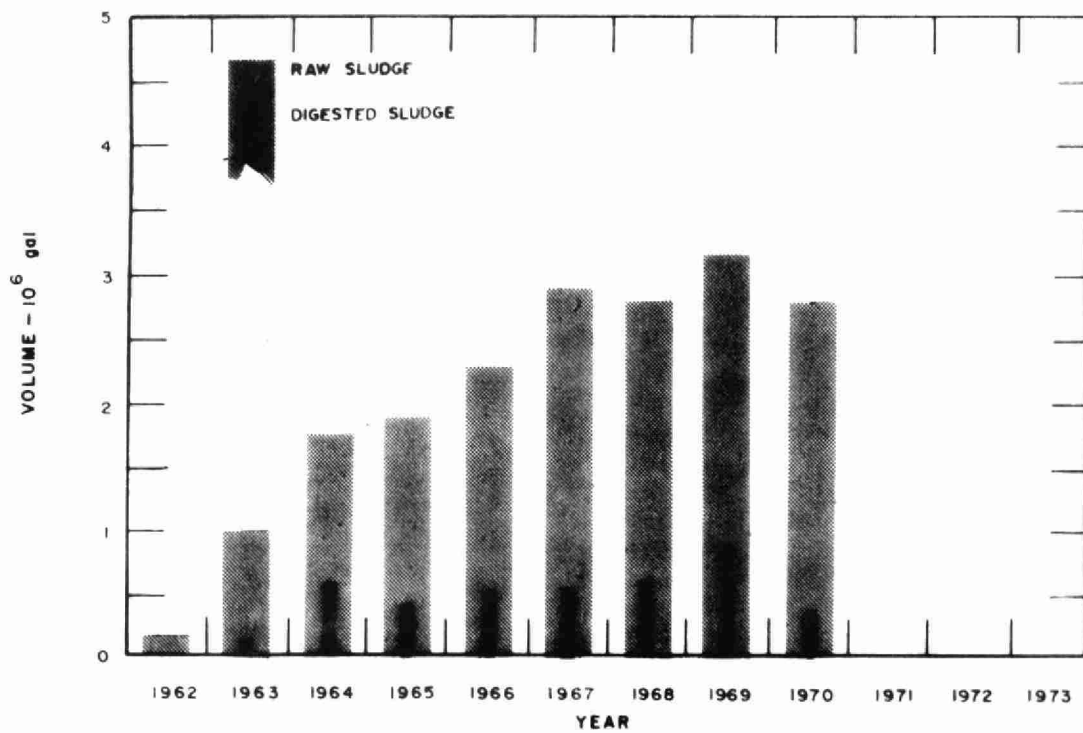
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED cu ft
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10 ³ pounds	n	mg/l	n	mg/l	%	10 ³ pounds	
JAN	1	100	1	38	62	40	5	114	1	45	61	40	
FEB	1	70	1	22	69	20	4	102	1	15	85	40	
MAR	3	54	3	19	65	30	8	106	3	20	81	70	
APR	2	37	1	18	51	30	5	46	1	45	2	0	
MAY	1	70	1	18	74	60	5	84	1	15	82	70	
JUNE	2	260	2	22	92	20	7	160	2	10	94	20	
JULY	2	39	2	12	69	20	6	117	2	20	83	60	
AUG	1	50	2	12	76	20	7	85	2	15	82	40	
SEPT	0	-	0	-	-	-	0	-	0	-	-	-	
OCT	0	-	0	-	-	-	0	-	0	-	-	-	
NOV	1	42	1	20	52	20	4	31	2	11	65	20	
DEC	1	26	1	30	0	-	5	27	1	15	44	10	
TOTAL	15	-	15	-		-	56	-	16		-	-	
AVERAGE	-	79	-	20	74	29	-	92	-	19	79	37	

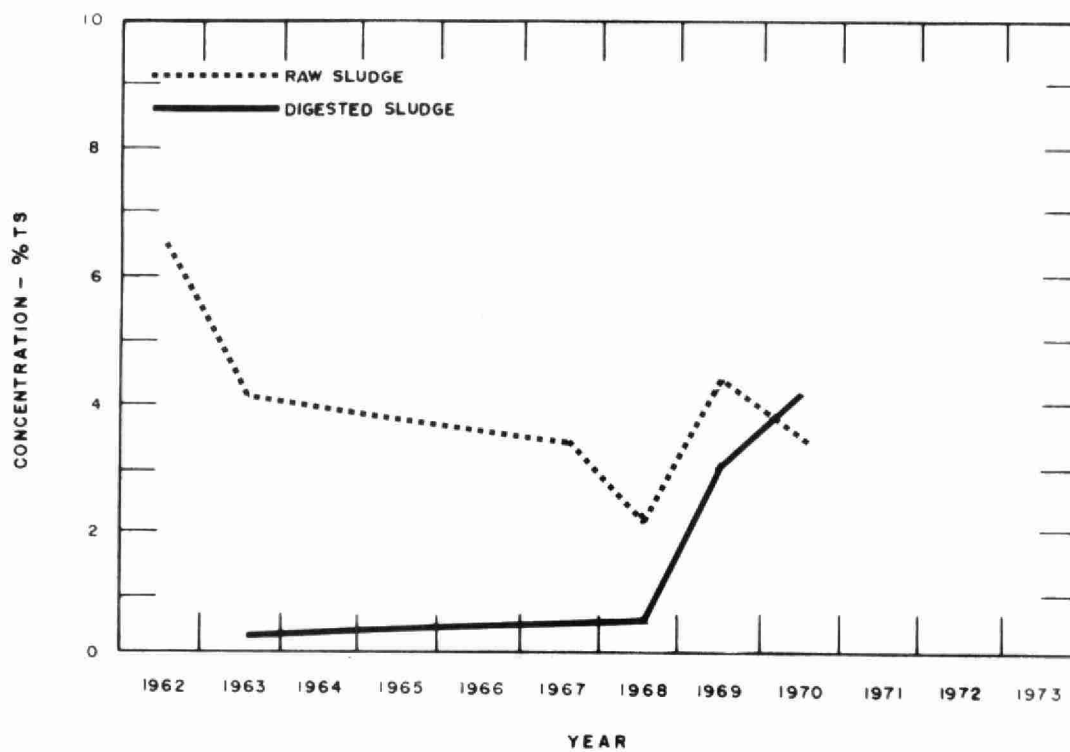
NOTE - n is the number of samples taken

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD lb MLSS	AIR USED 1000 cu ft lb BOD	WASTE SLUDGE lb/DAY
		BOD	SS	BOD	SS				
		mg/l	mg/l	mg/l	mg/l				
JAN	1.6	60	99	38	45	1260	.19		
FEB	1.8	55	98	22	15	1240	.20		
MAR	2.0	52	97	19	20	1850	.14		
APR	2.7	24	61	18	45	3190	.05		
MAY	2.7	22	33	18	15	1750	.09		
JUNE	1.9	26	35	16	5	1220	.10		
JULY	1.8	16	56	8	10	1560	-		
AUG	1.7	29	84	14	12	1750	.07		
SEPT	.9	-	-	-	-	1100	-		
OCT	.9	-	-	-	-	1600	-		
NOV	1.8	18	26	6	-	1590	.05		
DEC	1.5	19	14	2	-	1970	.04		
TOTAL	-	-	-	-	-	-	-		
AVERAGE	1.8	32	60	16	21	1670	.10		



DIGESTION



SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	DEWATERED	LIQUID
	10 ³ gal	%	%	10 ³ gal	%	%	10 ³ gal	%	cu yd	cu yd
JAN	240	2.7	65	112	-	-	40	1.5	0	0
FEB	230	4.7	67	8	2.0	54	120	-	0	0
MAR	270	3.8	50	0	3.4	48	180	-	0	0
APR	230	1.2	44	0	4.7	30	150	-	0	0
MAY	270	2.1	49	89	6.0	43	90	-	0	0
JUNE	280	6.6	85	81	4.8	43	70	-	0	0
JULY	300	-	-	166	-	-	40	-	0	0
AUG	300	-	-	102	-	-	60	-	0	0
SEPT	210	-	-	50	-	-	70	-	0	52.7
OCT	0	-	-	*	-	-	0	-	0	122.0
NOV	250	-	-	*	-	-	100	-	0	10.0
DEC	260	-	-	0	-	-	170	-	0	0
TOTAL	2840	-	-	970	-	-	1090	-	0	184.7
AVERAGE	-	3.5	60	-	4.2	44	-	1.5	0	-

* Digester emptied - 370,000 gallons

*969360001162222

96936000119390

[illegible]

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Water management in Ontario